STS-108

FLIGHT READINESS REVIEW

November 15, 2001

Ground Operations

AGENDA

- Shuttle Processing
  - Integrated Operations — J. Vevera
  - Shuttle Engineering — C. Connolly
  - Launch and Landing — M. Leinbach
  - Summary — D. King, A. Allen, C. Murphy

PROCESSING DIFFERENCES

Presenter:
Jim Vevera
Organization/Date:
Ground Ops/11-15-01

Processing Differences - VAB / Pad

- Planned
  - MICRO TAU/SGU Installation Mod
  - Aft Wire Separation Mod
  - Orbiter Frequency Response Test

- Unplanned
  - Late Payload Delivery
  - Orbiter Window Inspection
  - LOX 17” Disconnect Connector Repair
  - SSME #2 YAW Actuator R&R
  - S0038 SSV Rollback Preps

STS-108 / OV-105
Integrated Operations Assessment Summary

OPR: USA - J. Vevera, INT FM (1-2567)
NASA - J. Guidi, PH-A2 (1-9223)

Payload: ISS-12-UF1/MPLM2(P)-02 (VERT)

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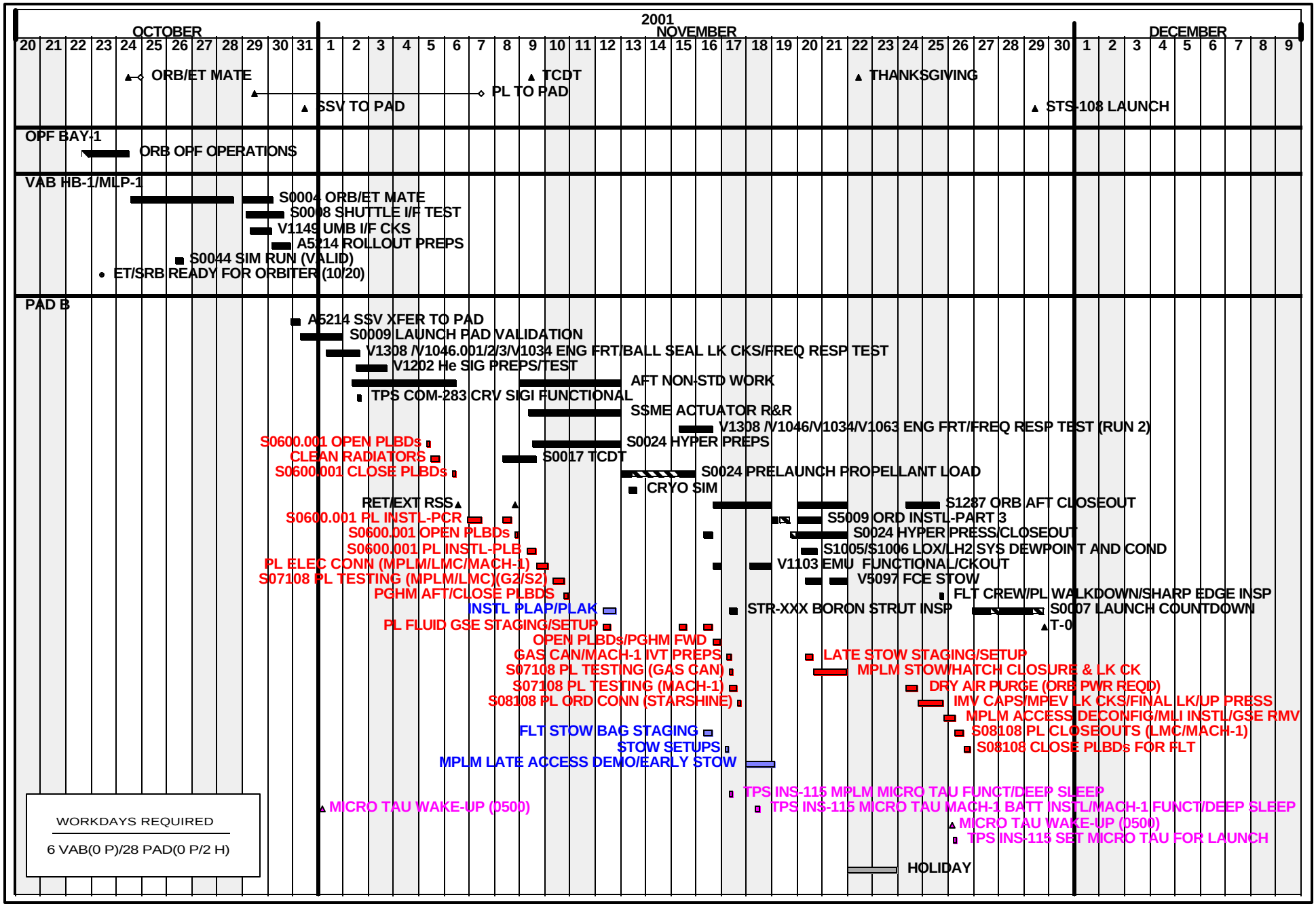

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SHUTTLE ENGINEERING OVERVIEW

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

The following Topics have been reviewed:

• Requirements Status – OMRS	No Issues
• TOPS Status	No Issues
• LCC/GLS Status	No Issues
• Software, SCAN, and Configuration Status	No Issues
• Vehicle/GSE Modification Status	No Issues
• In-Flight Anomaly Status	No Issues
• Lost Item Problem Reports	No Issues
• Time/Life Cycle	No Issues
• Critical Process Changes	No Issues
• Unexplained Anomalies	To Be Presented
• Safety, Quality, and Mission Assurance	No Issues
• Engineering Topics	No Issues
• Nonstandard Work Summary	No Issues (in backup)

UNEXPLAINED ANOMALIES

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

- Closed - None
- Open - 1
  - PR S78-0220-02-037-0011: ET Ground GH2 Vent QD Poppet damaged
- Deferred - 1
  - * PR UA-5-A0090: Galley Potable Water Flow Rates Degraded

(* Presented at STS-108 ORR. In Backup)

UNEXPLAINED ANOMALY
ET GROUND GH2 VENT QD POPPET

Presenter:
Chris Connolly

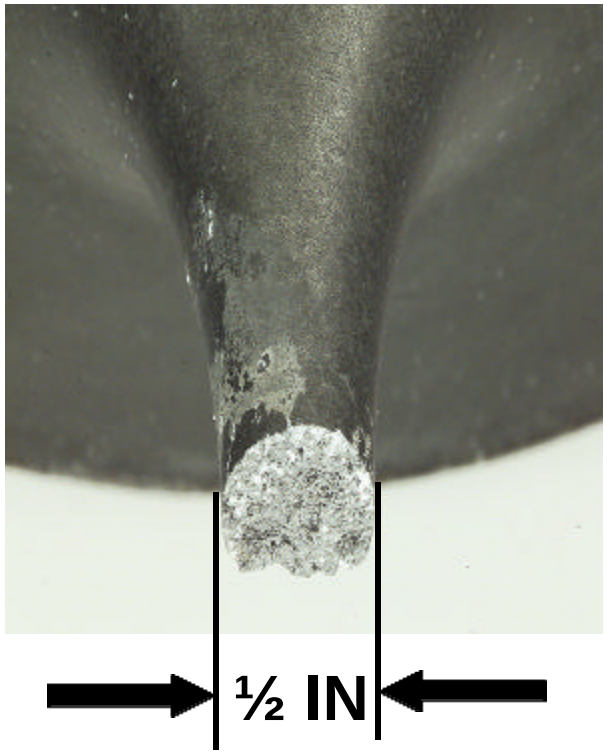
Organization/Date:
Ground Ops/11-15-01

- Observation
  - Following OV-103 STS-105 Launch, inspections discovered a portion of the ET's Ground GH2 vent QD poppet stem broke off
- Concerns
  - Integrity of Ground QD poppet currently installed to support STS-108/ET-111
- Discussion
  - ET's Ground GH2 Vent QD
    - QD component of ET Ground Umbilical Carrier Assembly (GUCA)
    - Allows venting of ET's LH2 Tank to facility
    - QD poppet held open while GUCA is mated to ET
    - At Launch, GUCA disconnects and QD poppet closes to prevent GH2 backflow from vent line and possible ignition

UNEXPLAINED ANOMALY
ET GROUND GH2 VENT QD POPPET (CONT'D)

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01



Typical Replacement

UNEXPLAINED ANOMALY
ET GROUND GH2 VENT QD POPPET (CONT'D)

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

- Actions Taken
  - Analysis determined the poppet fracture was a result of a single instantaneous failure mode
    - Brittle overload event
    - Side load estimated at 230 in-lbs ambient or 330 in-lbs under cryogenic conditions
    - Unable to locate missing piece at Pad-A
  - Discrepant QD poppet was used for 16 launch cycles
    - 16 launch cycles was the fleet leader
    - Poppets are certified for 55 launch cycles
  - STS-108 QD was suspect based on material usage
    - Unit had 13 launch cycles
    - Lack of specific pre-installation inspection for surface flaws

UNEXPLAINED ANOMALY
ET GROUND GH2 VENT QD POPPET (CONT'D)

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

- Actions Taken (Cont'd)
  - New redesigned GH2 Vent QD was installed on ET-111
    - New QD has zero launch cycles
    - Ground and Flight interfaces were verified free of defects
      - More detailed inspection process
  - Vendor material analysis is inconclusive as to root cause of STS-105 QD poppet fracture
    - Possible higher material porosity than normal but within manufacturing specifications

UNEXPLAINED ANOMALY
ET GROUND GH2 VENT QD POPPET (CONT'D)

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

- Most Probable Cause
  - Failure result of T-0 separation event
    - Combination of material degradation of poppet and undetected surface defect on the ground/flight contact surface made the poppet more susceptible to shear failure during the friction inducing sideload event
- Flight Rationale
  - Installation of new ET Ground GH2 QD on STS-108 removes the "most probable cause " scenario
    - Passed specific ground/flight interface inspection
    - Zero cycle usage for newly installed poppet
- Risk Assessment
  - As a result of new poppet with zero launch cycles and detailed inspection, reoccurrence of this anomaly is remote

ENGINEERING TOPIC
Midbody Boron Strut Clamp Issue

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

- Observation
  - OV-103 Boron Strut was found damaged in Mid Bay 7 at the location of a wire clamp
  - Three additional locations found where clamp was on boron portion of the strut
    - One on OV-102, One on OV-103, One on OV-104
- Concerns
  - Compromised Boron Strut Capability (Generic Problem)
- Actions Taken
  - Review of Clamp Installation Procedures
    - OMI that installed OV-103 clamp is unclear and may have contributed to mis-locating the clamp
  - Partial inspection of OV-102, OV-103 and OV-104

ENGINEERING TOPIC
Midbody Boron Strut Clamp Issue

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

OV-102

	Bay & Ring Frame																								
	1		2		3		4		5		6		7		8		9		10		11		12		13	Totals
Number of Struts	12	8	5	8	5	12	7	12	6	12	9	12	9	12	5	12	16	8	2	8	10	8	20	10	22	250
Number of Struts Inspected	11	8	5	8	2	10	5	10	4	12		12	7	12	3	11	2									122
Number of Clamps	3						1	1	1	4		23	5	6		16										60
Number of Suspect Clamps																										0
Number or Marginal Clamps	1													2		1										4
Number of Discrepant Clamps																1										1
Clamps need further inspection																										0

Bay 1: one clamp 50% onto boron
Bay 7: one clamp 28% onto boron, one clamp 15% onto boron
Bay 8: one clamp 28% onto boron, one clamp 100% on boron (clamp is loose)

OV-103

	Bay & Ring Frame																								
	1		2		3		4		5		6		7		8		9		10		11		12		13	Totals
Number of Struts	12	8	5	8	5	12	7	12	6	12	9	12	9	12	5	12	16	8	2	8	10	8	20	10	22	250
Number of Struts Inspected	12	8	5	8	5	3	4	12	6	10			2	12	1	10	6	8		8	4	8	16	10	18	176
Number of Clamps														4		1	2	3		3						13
Number of Suspect Clamps																										0
Number of Marginal Clamps																										0
Number of Discrepant Clamps													1	1												2
Clamps need further inspection							3		2	4			1													10

Bay 7: one clamp on boron, purge duct support (clamp is loose)

OV-104

	Bay & Ring Frame																								
	1		2		3		4		5		6		7		8		9		10		11		12		13	Totals
Number of Struts	12	8	5	8	5	12	7	12	6	12	9	12	9	12	5	12	16	8	2	8	10	8	20	10	22	250
Number of Struts Inspected		8	5	8	5	12	7	9	4	10			7	10	3	4	6			8	8	8	20	10	22	174
Number of Clamps						2	2						2	4	2	1	1			4						18
Number of Suspect Clamps																										0
Number of Marginal Clamps							2																			2
Number of Discrepant Clamps																	1									1
Clamps need further inspection								5	1	4		2		1		1										14

Bay 4: two clamps 50% onto boron

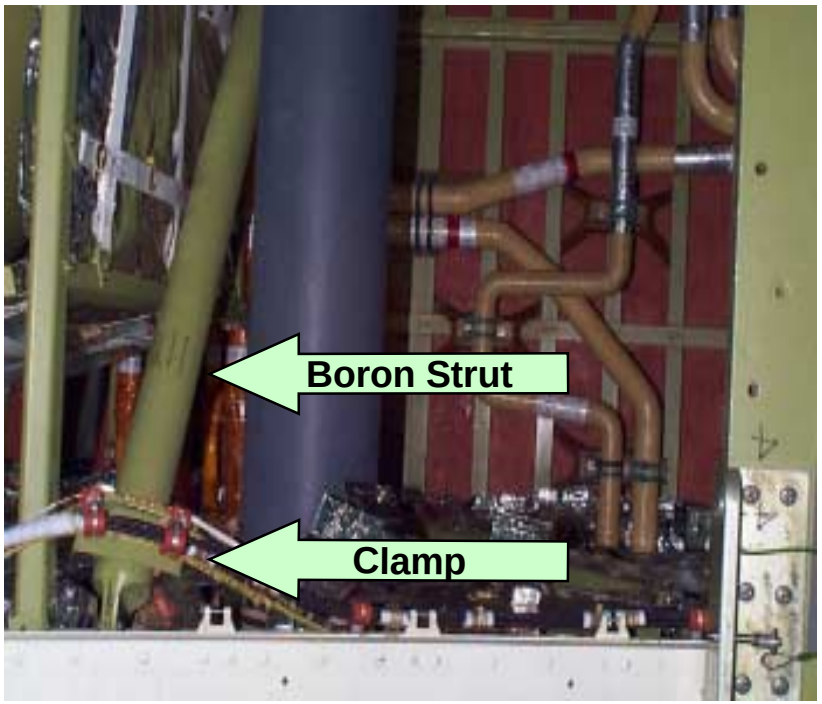
Inspection Status as of 11/14/01

United Space Alliance

ENGINEERING TOPIC
Midbody Boron Strut Clamp Issue

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01



Typical Clamp Installation

ENGINEERING TOPIC
Midbody Boron Strut Clamp Issue

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

- Actions Planned
  - Continue inspections on OV-102, 103, & 104
    - Goal is 100% inspection
  - Review installation paper for the 3 discrepant locations
  - Inspect accessible locations on OV-105
    - Bay 6 and 7 via the PLAP (Payload Late Access Platform)
  - Identify clamp installations on OV-105 via drawing review
  - Exonerate clamp installations via inspection, close-out photo review, design
  - Perform worst case stress analysis for all others
  - Identify struts with negative margin

STS-108 / OV-105
Launch Countdown Summary

OPR: J. Spaulding (1-9306)
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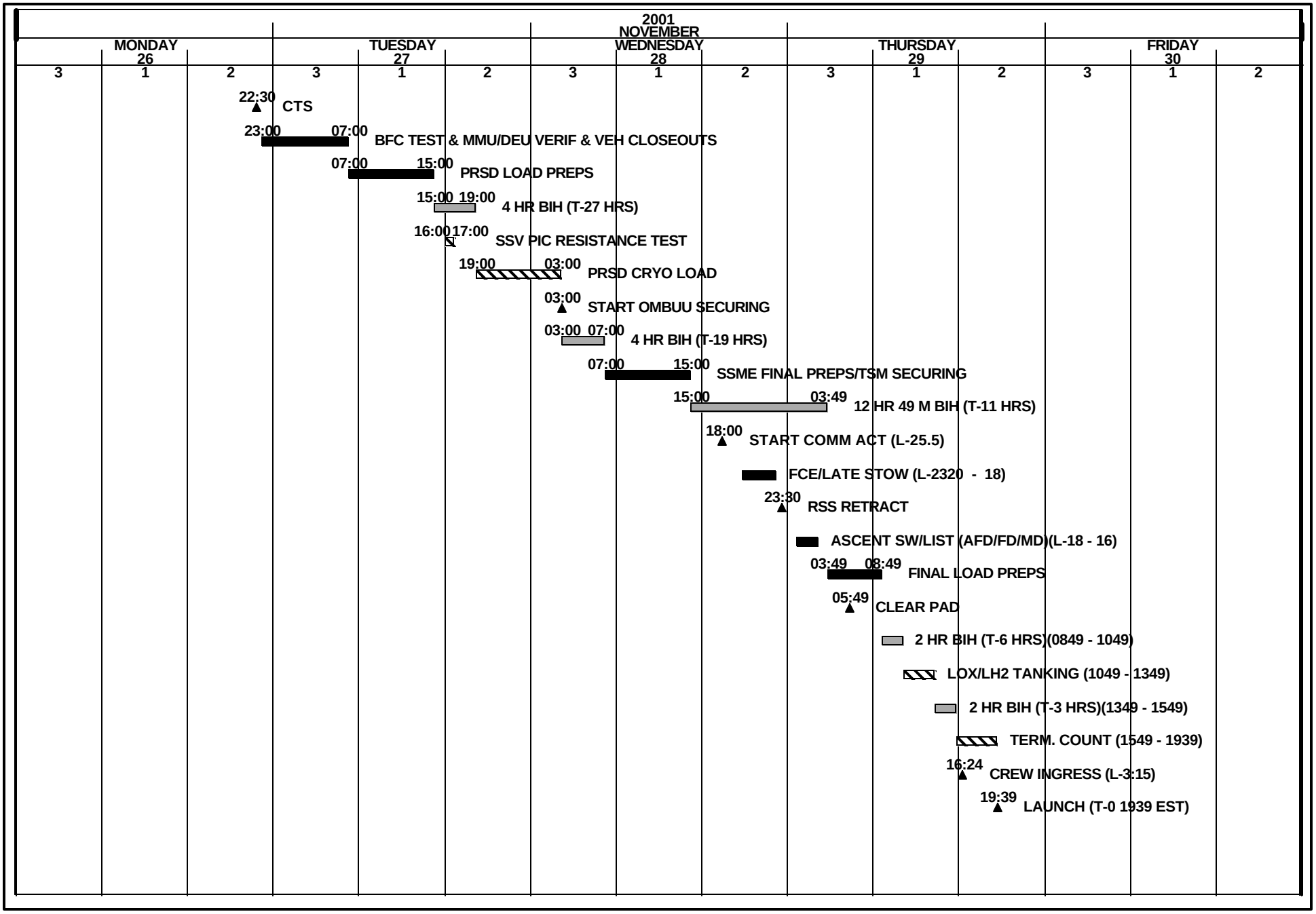

NOTE:
Actual scrub turnaround timelines will be determined realtime based on specific conditions encountered.

STS-108

LAUNCH COUNTDOWN TURNAROUND OPTIONS

OPR: J. Spaulding 1-9306

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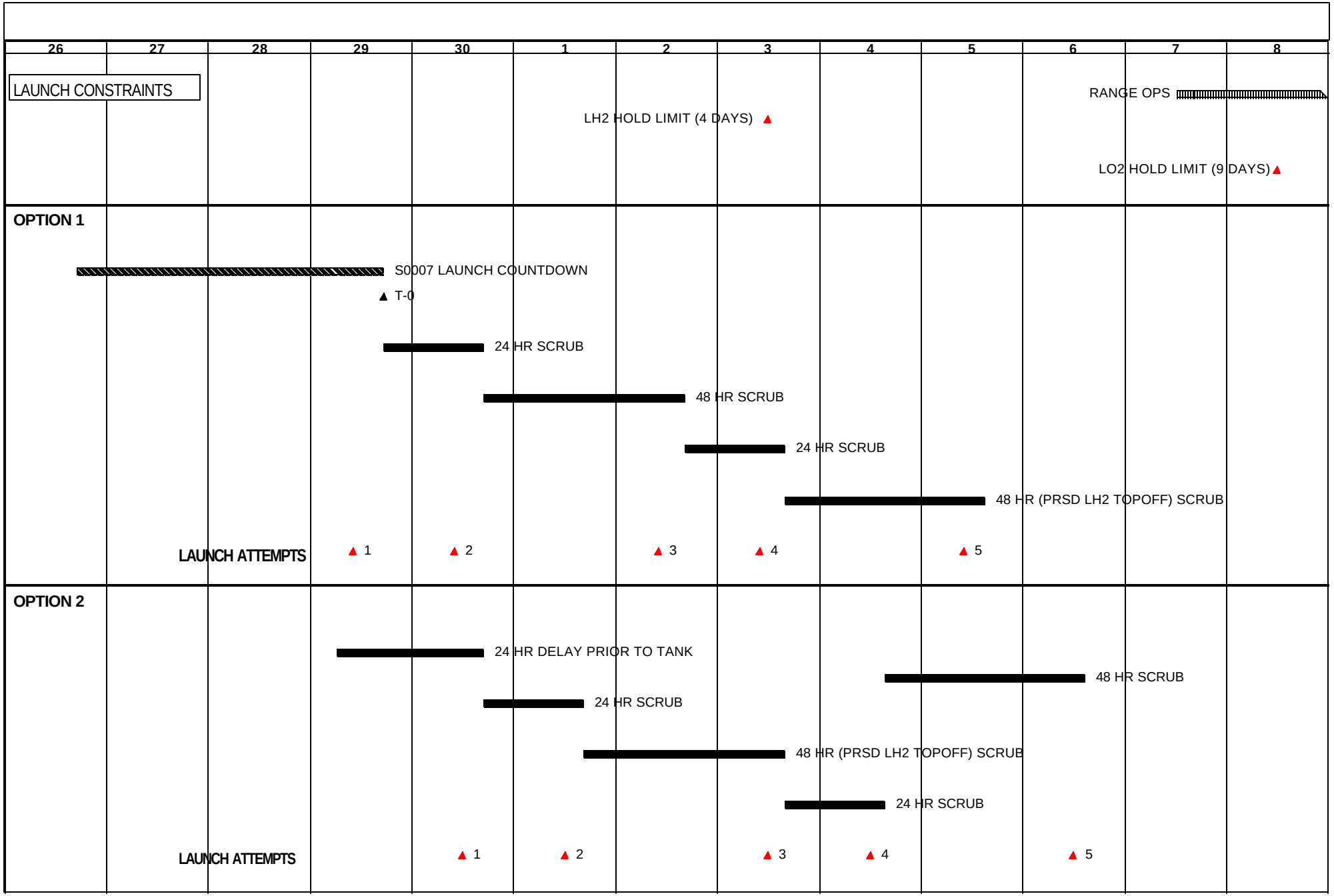


LANDING OPERATIONS STATUS

Presenter:
M. Leinbach

Organization/Date:
Launch & Landing/11-15-01

- Launch Support
  - **RTLS**: KSC
  - **TAL**:
    NASA GOMs/Security deploy for embassy meetings Nov 18/19
    - Zaragoza (Prime) — Deploy at L-6 days, Nov 23, 2001
    - Moron (Alt) — Deploy at L-6 days, Nov 23, 2001
    - Ben Guerir (Alt) — Deploy at L-6 days, Nov 23, 2001
  - **AOA**:
    - KSC (Prime)
    - WSSH (Alt) — Deploy at L-2 days, Nov 27, 2001
- Mission Support
  - KSC (Prime EOM)
  - DFRC/EDW — Deploy at L-2 days, Nov 27, 2001
  - WSSH
- Site Status
  - No Issues

Kennedy Space Center
Shuttle Processing Team

STS-108 Readiness Statement

This is to certify that appropriate CoFR items from NSTS-08117 Appendices H and Q, Flight Preparation Process Plan, have been reviewed and dispositioned. Subject to completion of planned work and resolution of any identified constraints, KSC Shuttle Processing and Supporting Organizations are ready to support Launch Operations.

S/Charles Fontana for
Charlie W. Murphy
APM, Integrated Logistics,
USA.

S/Andrew Allen
Andrew A. Allen
APM, Ground Operations,
USA.

S/David A. King
David A. King
Director of Shuttle Processing,
NASA

STS-108

FLIGHT READINESS REVIEW

November 15, 2001

Ground Operations
Back-Up

GROUND LAUNCH SEQUENCER

Presenter:
C. Connolly
Organization/Date:
Ground Ops/11-15-01

Ground Launch Sequencer Configuration for STS-108

- GLSDD (KLO-82-0071A) Rev 8, Change E, September 2001

SSID / OMRS	Description and Remarks
• Mask	
ECL-40	FC1&2 Payload Heat Exchanger Flow Rate
CT-01	TACAN 1 Range Built-in Status Word 2 Bit 4
CT-01	TACAN 2 Range Built-in Status Word 2 Bit 4 (TACAN 1 is Gould, TACAN 2 and 3 are Collins)
PAY-02	Payload Auxiliary RPC A & B - ON
PAY-03	Payload Aft Main B & C Power – ON
• Bypass	
SSME-02	SSME#3 is Block II
None	

UNEXPLAINED ANOMALIES

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01

- Closed - None
- Open - 1
  - PR UA-5-17-0090: Galley Potable Water Flow Rates Degraded

UNEXPLAINED ANOMALIES GALLEY POTABLE WATER FLOW RATES DEGRADED

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01

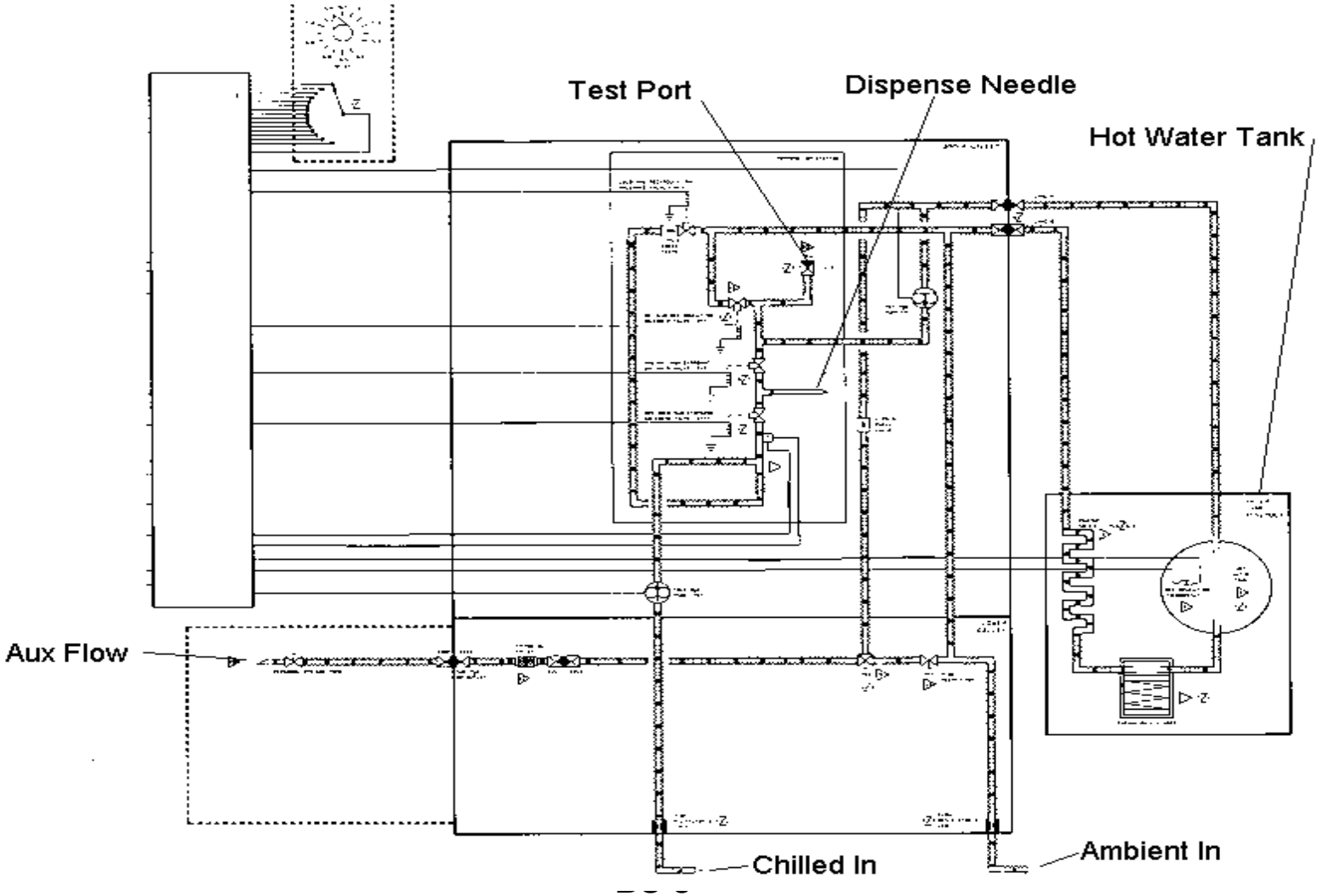
- Observation
  - Galley flowrates from the hot and cold needles degraded during 8 ounce dispenses (allowable is 210 to 251 mL)
    - Cold dispense quantities – 220, 210, **180**, **80** mL
    - Hot dispense quantities – **110**, **110**, **60** mL
  - Auxiliary H2O port experienced degraded flow
    - Provides water for personal hygiene
  - Problem occurred October 10, 2001

- Concerns
  - Affect In-Flight drink and bag fill operations
  - Use of alternate water collection points if dispense function failed

UNEXPLAINED ANOMALIES
GALLEY POTABLE WATER FLOW RATES DEGRADED (CONT'D)

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01



UNEXPLAINED ANOMALIES GALLEY POTABLE WATER FLOW RATES DEGRADED (CONT'D)

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01

- Discussion
  - 2 prior occurrences of degraded flow rate through Galley
    - STS-27 OV-103 S0007
      - Plastic bag material found in Galley supply valve
    - STS-82 OV-103
      - Cotton found in Galley supply valve
  - Galley connected to Orbiter via 2 QD's at Middeck floor
  - Water is supplied from Potable Tank A
  - Galley provides hot or cold water via the dispense needle
  - Control Electronic Assembly (CEA)
    - Utilized for control of dispenses
    - Selected quantities of 0.5 to 8.5 ounces available

UNEXPLAINED ANOMALIES GALLEY POTABLE WATER FLOW RATES DEGRADED (CONT'D)

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01

- Actions Taken
  - Multiple Galley dispenses performed with some degradation still present
  - Demated Galley QD and Orbiter flow was acceptable
  - Additional dispenses performed nominal
  - Topped off Orbiter Tank A
    - Compressibility checks indicate no presence of free gas
  - Subsequent system flushes and testing failed to identify or recreate flow anomaly

UNEXPLAINED ANOMALIES GALLEY POTABLE WATER FLOW RATES DEGRADED (CONT'D)

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01

- Possible Causes
  - Free air could cause intermittent flow reduction by affecting water pump performance
    - Orbiter system was evacuated and backfilled with water
      - Required vacuum of 25 mmHg was not obtained (actual 44 mmHg)
    - Post evaluation discovered air leak on GSE jumper assembly
  - Flow restriction/contamination could degrade flow
    - Both hot and cold Galley needle dispense flowrates affected
      - Common source is on Orbiter side between Tank A and Galley Supply valve tee
    - No intrusive work performed on Orbiter water system this flow
      - Galley hot water tank replaced

UNEXPLAINED ANOMALIES GALLEY POTABLE WATER FLOW RATES DEGRADED (CONT'D)

Presenter: C. Connolly

Organization/Date: Ground Ops/11-15-01

- Most Probable Cause
  - Free air in the system
- Flight Rationale
  - System redundancy not affected
    - Total failure of Galley dispense function requires potable water obtained from alternate source
      - Galley test port, Aux port, Interface or crossover QD's
  - Additional flow checks will be performed during normal Pad operations
- Risk Assessment
  - No risk to Flight and Crew's safety or Mission success

LOST ITEM PROBLEM REPORTS

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01

Lost Items Not Found (5 Total)

Summary/Conclusion for all LAF PR's

- A thorough search of each area was unsuccessful in finding/retrieving the lost items
- System Engineering evaluations have concluded no adverse effect on Orbiter system operations

Crew Module

- PR LAF-5-17-0319 Fastener MD112-3003-0106 missing:
  - Weight: 0.5 grams
  - Size: 0.2 inch by 0.4 inch
  - Location: AV Bay 3B

LOST ITEM PROBLEM REPORTS

Presenter:
C. Connolly

Organization/Date:
Ground Ops/11-15-01

Crew Module (Cont'd)

- PR LAF-5-17-0321 #10 Apex bit missing:
  - Weight: 10.75 grams
  - Size: 0.25 inch by 2 inch
  - Location: Crew module

- PR LAF-5-17-0324 Key collar of QD 80V61MD143:
  - Weight: 1 gram
  - Size: 0.625 inch by 0.032 inch
  - Location: WCS area

LOST ITEM PROBLEM REPORTS

Presenter:
C. Connolly
Organization/Date:
Ground Ops/11-15-01

Forward

- PR LAF-5-17-0326 3 X 5 index card:
  - Weight: 1 gram
  - Size: 3 inch X 5 inch
  - Location: FRCS

AFT

- PR LAF-5-17-0327 Aft door frame nutplate element:
  - Weight: 0.6 grams
  - Size: 0.35” X 0.225” X 0.227”
  - Location: Aft compartment

ENGINEERING TOPIC
STS-105 LDB I/O ERRORS

Presenter:
Chris Connolly

Organization/Date:
Ground Ops/11-15-01

- Observation
  - LDB1 I/O Timeout errors occurred during STS-105 launch at T-4 second
  - LDB1 I/O errors did not impact the successful launch of STS-105

- Discussion
  - Post Launch troubleshooting indicated LDB1 MLP wiring failed signal isolation checks
  - Inspection found condensation that migrated inside MLP Orbiter/LPS Signal Adapter (OLSA) cable which caused a short
  - Short cause downlink signal strength to fall below threshold
  - GPC's forced auto switch to backup LDB after 3 consecutive I/O errors
  - OLSA rack/cables were dried out and retest was successful

ENGINEERING TOPIC STS-105 LDB I/O ERRORS (CONT'D)

Presenter: Chris Connolly

Organization/Date: Ground Ops/11-15-01

- Corrective Action
  - Elevated all 3 MLP's OLSA room temperatures and plugging of conduit will preclude formation of condensation